

AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method for operating a path network for carrying out communications between nodes using one or more working paths and one or more protection paths, the method comprising the steps of:

transmitting path signals from a transmitting node to a receiving node through the working paths and the protection paths; and

converting a one of the protection path paths into a working path temporarily in order to increase a bandwidth of the working paths when a bandwidth increase request occurs in the path network.

2. (Currently amended) The method of claim 1, wherein at the transmitting step, the transmitting node transmits the path signals obtained by attaching a path overhead to client signals, where the path overhead contains an automatic path conversion information to be used in converting a protection path into a working path, and

at the converting step, the transmitting node and the receiving node convert a the protection path into a working path by using the automatic path conversion information contained in the path overhead.

3. (Currently amended) The method of claim 2, wherein the converting step further comprises the steps of:

at the transmitting node, transmitting the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion

request for requesting a conversion of a the protection path into a working path to the receiving node;

at the receiving node, in response to the protection path conversion request, reserving an output terminal at a receiving side, connecting an input of the output terminal to a path from which the protection path conversion request is received, and returning the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion reverse request for requesting transmission of signals through a converted path to the transmitting node; and

at the transmitting node, in response to the protection path conversion reverse request, transmitting the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion complete notice to the receiving node, through the converted path.

4. (Original) The method of claim 1, further comprising the steps of:
adding protection paths in order to increase a bandwidth of the protection paths after the converting step; and

re-arranging the working paths and the protection paths after the adding step such that all the working paths connect the transmitting node and the receiving node via a first route and all the protection paths connect the transmitting node and the receiving node via a second route.

5. (Original) The method of claim 4, further comprising the steps of:
assigning priority orders among the working paths and the protection paths in advance, such that the converting step converts a protection path with a highest priority order into a working path;

wherein the re-arranging step re-arranges the working paths and the protection paths by re-assigning the priority orders among the working paths and the protection paths.

6. (Currently amended) The method of claim 5, wherein at the transmitting step, the transmitting node transmits the path signals obtained by attaching a path overhead to client signals, through each one of the working paths and the protection paths, where the path overhead attached to the path signals to be transmitted through each path contains a priority order information indicating a priority order of each path, and

at the converting step, the transmitting node and the receiving node convert a the protection path into a working path by using the priority order information contained in the path overhead attached to the path signals transmitted through each path.

7. (Original) The method of claim 1, further comprising the step of:
releasing a part of the working paths and the protection paths in order to reduce a bandwidth of the working paths and the protection paths when a required bandwidth in the path network decreases.

8. (Currently amended) A path network for carrying out communications between nodes, comprising:

a transmitting node for transmitting path signals;
a receiving node for receiving the path signals; and
one or more working paths and one or more protection paths for transmitting path signals between the transmitting node and the receiving node;
wherein the transmitting node and the receiving node have a function for converting a one of the protection path paths into a working path temporarily in order to increase a bandwidth of the working paths when a bandwidth increase request occurs in the path network.

9. (Currently amended) The path network of claim 8, wherein the transmitting node has path generation units for transmitting the path signals obtained by attaching a path overhead to client signals, where the path overhead contains an automatic path conversion

information to be used in converting a the protection path into a working path, and the receiving node has path termination units for applying a termination processing to the path overhead, such that the path generation units and the path termination units convert a the protection path into a working path by using the automatic path conversion information contained in the path overhead.

10. (Currently amended) The path network of claim 9, wherein the transmitting node has path generation units for transmitting the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion request for requesting a conversion of a the protection path into a working path to the receiving node;

the receiving node has path termination units for reserving an output terminal at a receiving side, connecting an input of the output terminal to a path from which the protection path conversion request is received, and returning the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion reverse request for requesting transmission of signals through a converted path to the transmitting node, in response to the protection path conversion request; and

the path generation units of the transmitting node also transmit the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion complete notice to the receiving node, through the converted path, in response to the protection path conversion reverse request.

11. (Currently amended) The path network of claim 8, further comprising:
a network management system for adding protection paths in order to increase a bandwidth of the protection paths after a the conversion of a the protection path into a working path, and re-arranging the working paths and the protection paths after an addition of the protection paths such that all the working paths connect the transmitting node and the

receiving node via a first route and all the protection paths connect the transmitting node and the receiving node via a second route.

12. (Original) The path network of claim 11, wherein the network management system also assigns priority orders among the working paths and the protection paths in advance, such that the transmitting node and the receiving node convert a protection path with a highest priority order into a working path, and re-arranges the working paths and the protection paths by re-assigning the priority orders among the working paths and the protection paths.

13. (Original) The path network of claim 12, wherein the transmitting node has path generation units for transmitting the path signals obtained by attaching a path overhead to client signals, through each one of the working paths and the protection paths, where the path overhead attached to the path signals to be transmitted through each path contains a priority order information indicating a priority order of each path, and the receiving node has path termination units for applying a termination processing to the path overhead, such that the path generation units and the path termination units convert a protection path into a working path by using the priority order information contained in the path overhead attached to the path signals transmitted through each path.

14. (Original) The path network of claim 8, wherein the transmitting node and the receiving node also have a function for releasing a part of the working paths and the protection paths in order to reduce a bandwidth of the working paths and the protection paths when a required bandwidth in the path network decreases.

15. (Currently amended) A node device functioning as a transmitting node in a path network for carrying out communications between nodes using one or more working paths and one or more protection paths, the node device comprising:

a plurality of path generation units, each path generation unit transmits path signals obtained by attaching a path overhead to client signals, where the path overhead contains an automatic path conversion information to be used in converting a one of the protection path paths into a working path, such that a the protection path is converted into a working path temporarily by using the automatic path conversion information contained in the path overhead, in order to increase a bandwidth of the working paths when a bandwidth increase request occurs in the path network;

a plurality of multiplexing units, each multiplexing unit multiplexes the path signals to be transmitted through each route and transmits multiplexed path signals through each route; and

a switch unit for switching the path signals transmitted by the path generation units into the multiplexing units.

16. (Currently amended) The node device of claim 15, wherein at a time of converting a the protection path into a working path, the path generation units transmit the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion request for requesting a conversion of a protection path into a working path to the receiving node, and when the transmission node receives the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion reverse request for requesting transmission of signals through a converted path to the transmitting node, that is returned from the receiving node in response to the protection path conversion request, the path generation units transmit the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion complete notice to the receiving node, through the converted path, in response to the protection path conversion reverse request.

17. (Currently amended) The node device of claim 15, wherein each path generation unit attaches the path overhead that also contains a priority order information

indicating a priority order of each path to the path signals to be transmitted through each path, such that the transmitting node and the receiving node convert a the protection path into a working path by using the priority order information contained in the path overhead attached to the path signals transmitted through each path.

18. (Currently amended) A node device functioning as a receiving node in a path network for carrying out communications between nodes using one or more working paths and one or more protection paths, the node device comprising:

a plurality of path termination units, each path termination unit applies a termination processing to a path overhead attached to path signals received from a transmitting node, where the path overhead contains an automatic path conversion information to be used in converting a one of the protection ~~path~~ paths into a working path, such that a the protection path is converted into a working path temporarily by using the automatic path conversion information contained in the path overhead, in order to increase a bandwidth of the working paths when a bandwidth increase request occurs in the path network;

a plurality of demultiplexing units, each demultiplexing unit demultiplexes multiplexed path signals transmitted through each route into path signals for each path; and

a switch unit for switching the path signals for each path obtained by the demultiplexing units into the path termination units.

19. (Currently amended) The path network of claim 18, wherein at a time of converting a the protection path into a working path, when the receiving node receives the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion request for requesting a conversion of a protection path into a working path from the transmitting node, the path termination units reserve an output terminal at a receiving side, connect an input of the output terminal to a path from which the protection path conversion request is received, and return the path signals with the path overhead that contains the automatic path conversion information indicating a

protection path conversion reverse request for requesting transmission of signals through a converted path to the transmitting node, in response to the protection path conversion request, and receive the path signals with the path overhead that contains the automatic path conversion information indicating a protection path conversion complete notice from the transmitting node, through the converted path, in response to the protection path conversion reverse request.

20. (Currently amended) The node device of claim 18, wherein each path termination unit applies the termination processing to the path overhead attached to the path signals for each path that also contains a priority order information indicating a priority order of each path, such that the transmitting node and the receiving node convert a the protection path into a working path by using the priority order information contained in the path overhead attached to the path signals transmitted through each path.